

## 5 CLAIMS

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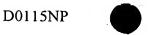
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## WHAT IS CLAIMED IS:

An isolated nucleic acid molecule comprising a polynucleotide having a nucleotide sequence at least 95.0% identical to a sequence selected from the group consisting of:

- (a) a polynucleotide fragment of SEQ ID NO:1 or a polynucleotide fragment of the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO1;
- (b) a polynucleotide encoding a polypeptide fragment of SEQ ID NO:2 or a polypeptide fragment encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1;
- (c) a polynucleotide encoding a polypeptide domain of SEQ ID NO:2 or a polypeptide domain encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1;
- (d) a polynucleotide encoding a polypeptide epitope of SEQ ID NO:2 or a polypeptide epitope encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1;
- (e) a polynucleotide encoding a polypeptide of SEQ ID NO:2 or the cDNA sequence included in ATCC Deposit No:-XXXXX, which is hybridizable to SEQ ID NO:1, having potassium channel beta subunit activity;
  - (f) a polynucleotide which is a variant of SEQ ID NO:1;
  - (g) a polynucleotide which is an allelic variant of SEQ ID NO:1;
- (h) an isolated polynucleotide comprising nucleotides 8 to 1057 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 351 of SEQ ID NO:2 minus the start codon;
- (i) an isolated polynucleotide comprising nucleotides 5 to 1057 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 1 to 351 of SEQ ID NO:2 including the start codon;
  - (j) a polynucleotide which represents the complimentary sequence (antisense) of SEQ ID NO:1;



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- (k) a polynucleotide fragment of SEQ ID NO:24 or a polynucleotide fragment of the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:23;
- a polynucleotide encoding a polypeptide fragment of SEQ ID NO:24 or a polypeptide fragment encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:23;
- (m)a polynucleotide encoding a polypeptide domain of SEQ ID NO:24 or a polypeptide domain encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:23;
- (n) a polynucleotide encoding a polypeptide epitope of SEQ ID NO:24 or a polypeptide epitope encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:23;
- (o) a polynucleotide encoding a polypeptide of SEQ ID NO:24 or the cDNA sequence included in APCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:23, having potassium channel beta subunit activity;
- (p) a polynucleotide which is a variant of SEQ ID NO:23;
- (q) a polynucleotide which is an allelic variant of SEQ ID NO:23;
- (r) an isolated polynucleotide comprising nucleotides 4 to 1029 of SEQ ID NO:23, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 343 of SEQ ID NO:24 minus the start codon;
- (s) an isolated polynucleotide comprising nucleotides 1 to 1029 of SEQ ID NO:23, wherein said nucleotides encode a polypeptide corresponding to amino acids 1 to 343 of SEQ ID NO:24 including the start codon;
- (t) a polynucleotide which represents the complimentary sequence (antisense) of SEQ ID NO:23; and
- (u) a polynucleotide capable of hybridizing under stringent conditions to any one of the polynucleotides specified in (a)-(t), wherein said polynucleotide does not hybridize under stringent conditions to a nucleic acid molecule having a nucleotide sequence of only A residues or of only T residues.
- 2. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises a nucleotide sequence encoding a human potassium channel beta subunit protein.

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- 5 3. A recombinant vector comprising the isolated nucleic acid molecule of claim 1.
  - 4. A recombinant host cell comprising the vector sequences of claim 3.
  - 5. An isolated polypeptide comprising an amino acid sequence at least 95.0% identical to a sequence selected from the group consisting of:
  - (a) a polypeptide fragment of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;
    - (b) a polypeptide fragment of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX, having potassium channel beta subunit activity;
    - (c) a polypeptide domain of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;
    - (d) a polypeptide epitope of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;
    - (e) a full length protein of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;
      - (f) a variant of SEQ ID NØ:2;
      - (g) an allelic variant of SEO ID NO:2;
      - (h) a species homologue of SEQ ID NO:2;
    - (i) a polypeptide comprising amino acids 2 to 351 of SEQ ID NO:2, wherein said amino acids 2 to 351 comprise a polypeptide of SEQ ID NO:2 minus the start methionine;
      - (j) a polypeptide comprising amino acids 1 to 351 of SEQ ID NO:2;
      - (k) a polypeptide encoded by the cDNA contained in ATCC Deposit No. XXXXX;
  - (l) a polypeptide fragment of SEQ ID NO:24 or the encoded sequence included in ATCC Deposit No: XXXXX;
    - (m) a polypeptide fragment of SEQ ID NO:24 or the encoded sequence included in ATCC Deposit No: XXXXX, having potassium channel beta subunit activity;
  - (n) a polypeptide domain of SEQ ID NO:24 or the encoded sequence included in ATCC Deposit No: XXXXX;

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- (o) a polypeptide epitope of SEQ ID NO:24 or the encoded sequence included in ATCC Deposit No: XXXXX;
- (p) a full length protein of SEQ ID NO:24 or the encoded sequence included in ATCC Deposit No: XXXXX;
  - (q) a variant of SEQ ID NO:24;
  - (r) an allelic variant of SEQ ID NO:24;
  - (s) a species homologue of SEQ ID NO:24;
- (t) a polypeptide comprising amino acids 2 to 343 of SEQ ID NO:24, wherein said amino acids 2 to 343 comprise a polypeptide of SEQ ID NO:24 minus the start methionine;
  - (u) a polypeptide comprising amino acids 1 to 343 of SEQ ID NO:24; and
- (v) a polypeptide encoded by the cDNA contained in ATCC Deposit No. XXXXX.
- 6. The isolated polypeptide of claim 5, wherein the full length protein comprises sequential amino acid deletions from either the C-terminus or the N-terminus.
- 7. An isolated antibody that binds specifically to the isolated polypeptide of claim 5.
- 8. A recombinant host cell that expresses the isolated polypeptide of claim 5.
  - 9. A method of making an isolated polypeptide comprising:
- (a) culturing the recombinant host cell of claim 8 under conditions such that said polypeptide is expressed; and
  - (b) recovering said polypeptide.
  - 10. The polypeptide produced by claim 9.
- 11. A method for preventing, treating, or ameliorating a medical condition, comprising the step of administering to a mammalian subject a therapeutically effective amount of the polypeptide of claim 5 or the polynucleotide of claim 1.
  - 12. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:
  - (a) determining the presence or absence of a mutation in the polynucleotide of claim 1; and

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- (b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or absence of said mutation.
  - 13. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:
  - (a) determining the presence or amount of expression of the polypeptide of claim 5 in a biological sample; and
  - (b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or amount of expression of the polypeptide.
  - 14. An isolated nucleic acid molecule consisting of a polynucleotide having a nucleotide sequence selected from the group consisting of:
    - (a) a polynucleotide encoding a polypeptide of SEQ ID NO:2;
  - (b) an isolated polynucleotide consisting of nucleotides 8 to 1057 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 351 of SEQ ID NO:2 minus the start codon;
  - (c) an isolated polynucleotide consisting of nucleotides 5 to 1057 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 1 to 351 of SEQ ID NO:2 including the start codon;
  - (d) a polynucleotide encoding the K+betaM4 polypeptide encoded by the cDNA clone contained in ATCC Deposit No. XXXXX;
  - (e) a polynucleotide which represents the complimentary sequence (antisense) of SEQ ID NO:41;
    - (f) a polynucleotide encoding a polypeptide of SEQ ID NO:24;
  - (g) an isolated polynucleotide consisting of nucleotides 8 to 1057 of SEQ ID NO:23, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 351 of SEQ/ID NO:24 minus the start codon;
  - (h) an isolated polynucleotide consisting of nucleotides 5 to 1057 of SEQ ID NO:23, wherein said nucleotides encode a polypeptide corresponding to amino acids 1 to 351 of SEQ ID NO:24 including the start codon;
  - (i) a polynucleotide encoding the K+betaM5 polypeptide encoded by the cDNA/clone contained in ATCC Deposit No. XXXXX; and
  - / (j) a polynucleotide which represents the complimentary sequence (antisense) of SEQ ID NO:23.

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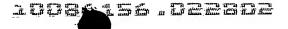
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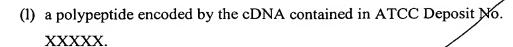
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- 15. The isolated nucleic acid molecule of claim 14, wherein the polynucleotide comprises a nucleotide sequence encoding a human potassium channel beta subunit protein.
- 16. A recombinant vector comprising the isolated nucleic acid molecule of claim 15.
- 17. A recombinant host cell comprising the recombinant vector of claim 16.
- 18. An isolated polypeptide consisting of an amino acid sequence selected from the group consisting of:
- (a) a polypeptide fragment of SEQ ID NO:2/having potassium channel beta subunit activity;
- (b) a polypeptide domain of SEQ ID NO:2 having potassium channel beta subunit activity;
  - (c) a full length protein of SEQ ID/NO:2;
- (d) a polypeptide corresponding to amino acids 2 to 351 of SEQ ID NO:2, wherein said amino acids 2 to 351 comprise a polypeptide of SEQ ID NO:2 minus the start methionine;
  - (e) a polypeptide corresponding to amino acids 1 to 351 of SEQ ID NO:2;
  - (f) a polypeptide encoded by the cDNA contained in ATCC Deposit No. XXXXX;
  - (g) a polypeptide fragment of SEQ ID NO:24 having potassium channel beta subunit activity;
  - (h) a polypeptide domain of SEQ ID NO:24 having potassium channel beta subunit/activity;
  - (i) a full/length protein of SEQ ID NO:24;
  - (j) a polypeptide corresponding to amino acids 2 to 343 of SEQ ID NO:24, wherein said amino acids 2 to 343 comprise a polypeptide of SEQ ID NO:24 minus the start methionine;
  - (k) a polypeptide corresponding to amino acids 1 to 343 of SEQ ID NO:24; and

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- 19. The method for preventing, treating, or ameliorating a medical condition of claim 11, wherein the medical condition is selected from the group consisting of a hepatic disorder, a neural disorder, a gastrointestinal disorder, a reproductive disorder, an immune disorder, a cardiovascular disorder, a renal disorder, a medical condition is a disorder related to hyper potassium channel activity.
- 20. The method for preventing, treating, or ameliorating a medical condition of claim 11, wherein the medical condition is selected from the group consisting of a reproductive disorder, a neural disorder, an immune disorder, a cardiovascular disorder, a gastrointestinal disorder, a renal disorder, a disorder related to hyper potassium channel activity, an immune disorder related to aberrant NF-kB activity, an immune disorder related to aberrant innate immunity, an infectious disease, an inflammatory disorder, and cancer.